WASHINGTON
SCIENCE TRENDS

HIGHLIGHTS

* DEFENSE COMMUNICATIONS CONTROL
* ELECTRIC WIND RESEARCH
* PROPULSION/TESTING RESEARCH
* TECHNICAL TRENDS
* INVENTIONS WANTED
* PUBLICATION CHECKLIST

Vol. IV, No. 22 August 15, 1960

* DEFENSE COMMUNICATIONS CONTROL SYSTEM

By July 1, 1963 the Defense Communication Agency (DCA) hopes to have in operation a Communications Control System which will automatically monitor critical long-haul strategic circuits throughout the world, providing rapid display in Washington of circuit availability, capability and interruptions. The system will also be capable of other engineering and management functions.

Industry has been asked to submit technical proposals by September 2, 1960, with an award of a contract expected by October 5. About 150 firms were notified; about 59 attended a briefing in which details were outlined.

When completed, the basic functions of the overall system will be:

✓ To assemble, store and display visually a composite picture of the current conditions prevailing on all circuits, channels, systems, subsystems and facilities comprising the Defense Communications System.

✓ To recognize and display visually in real time, degradation of performance in portions of the System -- and to make automatic computations leading to corrective action.

✓ To make automatic computations, predict and display visually anticipated overall System performance in the presence of natural ionospheric disturbances, "Argus" effects, catastrophic destruction of physical facilities and intentional jamming. Computations to determine optimum corrective measures in the presence of such catastrophic system degradation are also required.

✓ To recognize catastrophic failures in the System through the analysis of real time input, and to make analyses to determine the probable cause of such a failure.

ø Target Dates

February-March, 1961 -- A capability at the national level to automatically maintain and display continuously updated inventory and status information on channels, circuits and facilities -- largely on a manual basis utilizing existing facilities.

February, 1962 -- Expansion of national center to provide additional visual displays and capability for vulnerability analysis, propagation forecasts, traffic engineering and radio frequency engineering. In addition, manual regional centers will be established.

July, 1963 -- Automation of data input to national and regional centers and automation of information handling at regional centers. National center will have improved ability for real-time network control. Automatic quality sensors will be used to determine circuit status on a global basis.

* "ELECTRIC WIND" RESEARCH

Theoretical studies at the Jet Propulsion Laboratory of the National Aeronautics and Space Administration show some promise in a generator in which charges are carried by a gas flow, instead of by a belt as in a Van de Graaf generator.

The studies are based on findings that energy can be added to a gas flow by causing ions, under the action of an electric field to move through the gas -- sometimes referred to as "electric wind." By reversing this process, it is believed, energy can be extracted from a gas flow by causing the gas to move ions against the action of an electric field.

An analysis by M. C. Gourdine of JPL suggests several possible engineering applications including energy conversion from thermal to electrical; electrical power amplification, either AC or DC; voltage rectification and sound generation through conversion from electric to acoustic energy.

* FINDING TRACE ELEMENTS IN WATER

A new technique is said to permit accurate determination of about 24 elements in the single burning or arcing of a small quantity of residue from an evaporated sample of water, according to the Geological Survey.

The method is said to be reliable and extremely sensitive for silver, aluminum, boron, barium, berryllium, cobalt, chromium, cesium, copper, iron, germanium, lithium, manganese, molybdenum, nickel, phosphorous, lead, rubidium, silicon, tin, strontium, titanium, vanadium, zinc and zirconium.

The technique consists of complete vaporizing of 12 milligrams of water residue and synthetic standards, mixed with 6 milligrams of pure graphite powder, using a direct current arc of 16 amperes. The spectrum from the burning of the sample is recorded on a photographic plate. After processing the plates, the intensities of selected spectrum lines are measured. The concentrations of the elements are read from working curves prepared from standards.

(Detailed Report Available. 15 Cents. Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Water-Supply Paper 1540-A, U. S. Geological Survey)

* WORLD WAR II DATA DECLASSIFIED

Most technical documents of the World War II Office of Scientific Research and Development, the National Defense Research Committee and the Committee on Medical Research are being declassified and will be available to the general public. A large share of the technical documents will be turned over to the Library of Congress, where they will be available for study -- and to the Office of Technical Services, where they will be available for purchase.

Collections of reports are also widely held by contractors, universities, research laboratories and individual scientists throughout the country. To determine their classification status, special points of contact will be designated by the three military departments if there is a current contractual relationship with the Defense Department. Others holding reports may direct inquiries to the Adjutant General, Department of the Army, the Pentagon, Washington 25, D. C.

* PROPULSION/TESTING RESEARCH

The Arnold Engineering Development Center, U. S. Air Force, is looking for firms with experience in altitude propulsion testing facilities. A company is to be selected to conduct a one year study of future developments in liquid and solid fuel "rocket type propulsion devices" including a determination of new or modified facilities the Center might need for testing these engines.

The contractor to be selected must be qualified in such areas as altitude exhaust machinery, pressure recovery devices, steam and air ejectors and exhaust gas cooling systems.

(Write to Directorate of Procurement, Attn: AEK, Arnold Engineering Development Center, Arnold Air Force Station, Tenn. Include information on total number of employees and professional qualifications; description of general and special facilities; outline of previous projects; information on security clearance, and available descriptive literature. Deadline: September 1, 1960)

* NATIONAL SCIENCE FOUNDATION BUDGET

Here is the latest "breakout" of funds for the programs of the National Science Foundation for the Fiscal Years 1960 and 1961:

Basic Research Grants and Contracts -- $63 million; $67 million
Basic Research Facilities (Computers, Reactors, Astronomy, etc.) -- $14.8 million; $21 million
Antarctic Research -- $6.2 million; $5 million
Scientific Information Programs -- $5.5 million; $6.8 million
Institutional Grants -- $0; $1.9 million
Surveys and Reports; $300,000; $350,000
Support of Scientific Manpower (Fellowships, Summer Institutes, Curriculum Development, etc.) $64.3 million; $67.3 million

* LONG-DISTANCE RADAR

The National Bureau of Standards, under a special $550,000 Congressional appropriation, is building a high-powered transmitter-receiver near Lima, Peru for "space-exploration" by radar. Preliminary experiments at Long Branch, Illinois are said to have proved feasibility of the system by providing satisfactory results in ionospheric and exosphere studies.

The method, developed by K. L. Bowles of the NBS, employs a transmitter with a peak pulse power of six million watts, sending out a very high frequency wave lasting from 50-150 microseconds. A large and extremely sensitive broadside antenna is employed to detect the faint re-radiation of the pulsed radio waves by free electrons in the upper atmosphere.

The new installation, located at the magnetic equator, is expected to enable observations up to 1,800 miles and to extend the capabilities of the technique to measure such characteristics of the atmosphere as ion-temperature, precentage ion-composition, and intensity of the earth's magnetic field. According to the Bureau of Standards accurate measurement of the latter two quantities depends upon locating the radar within approximately five degrees latitude of the equator.

An additional feature of the new system is expected to be the capability of observing the sun by means of direct radio reflections, with a sensitivity greater than that ever used before.

TECHNICAL TRENDS

Radar switchboard fires have caused the Navy to issue new instructions specifying special printed circuit switchcard cleaning techniques. Fires were found to be caused by electrical arcs, which formed across metallic wear-particle paths that had accumulated between the contacts used to switch synchro leads... Army Engineer Research and Development Laboratories, Ft. Belvoir, Va. are developing a tank kit consisting of an infrared-visible xenon searchlight, a gunner's infrared-visible periscope, a commander's infrared periscope, and a hand-held infrared binocular to permit observation of an enemy at night by using either visible or infrared light... Digital velocity meters for the Midas and Samos military satellite programs will be supplied by Bell Aerosystems, Buffalo, N. Y...

Navy is ordering five new spectrometers of advanced design for expansion of its program in which engine conditions are determined through analysis of used oil samples. Specifications call for machines that will automatically produce a typed and punched card covering each analysis. In addition, a slave electric typewriter will print out results on a laboratory record sheet. Potential applications of this technique include detection of incipient trouble in turbo-prop gear boxes, constant speed drives and cabin superchargers...

Beech Aircraft, Wichita, Kansas is modifying eleven Army L-23D twin-engine Seminole Aircraft for installation of new side-looking airborne radar (SLAR) jointly developed by the Army Signal Corps and Texas Instruments, Inc... Industry has been asked for comments on a new Commercial Standard covering various types of polyethylene pipe. For a copy of Recommended Revision TS-5496 write H. A. Bonnet, Commodity Standards Division, U. S. Department of Commerce, Washington 25, D. C... Armour Research Foundation believes that particle counters can determine how many troops or vehicles are moving in a specific area by measurement of the concentration and size distribution of dust particles in an area. The system is an outgrowth of studies of "clean room" assembly facilities for gyroscopes and other sensitive instruments...

Tandem-Bladed Variable Camber propellers will be developed by Hamilton Standard Division of United Aircraft under a new $353,275 contract with the Bureau of Naval Weapons... The same agency has engaged Armour Research Foundation to study the technical and economic feasibility of using smokeless powder for the production of nitrocellulose and dinitrotoluene... The Federal Aviation Agency has signed a $5.7 million contract for the purchase of 36 complete and 31 partial radar beacon systems from the Telecomputing Corp. of Hollywood, Calif...

Competitive bidding will be used by the General Services Administration, Washington 25, D. C. to dispose of surplus stocks of lead vanadate ore; lead vanadate concentrates and fused vanadium pentoxide which are used to produce various metals and chemicals... Carbon 14, an important research radioisotope, reduced in price 50 percent last year, has now been cut in price another 27 percent by the Atomic Energy Commission... A 100 ton, high voltage unit will be built for Sperry Gyroscope, Great Neck, N. Y. to aid in the development of a new "super-power" klystron expected to be available for the Army's Nike-Zeus antimissile program... A "stressed plate shutter" developed by Electro-Optical Systems, Inc., Pasadena, Calif. under Army Ordnance sponsorship is said to be a possible modulator for an optical communications system in space. Other potential uses may include variable density filters, and cine shutters with speeds between 10,000 and 20,000 frames per second...

NASA RESEARCH AND DEVELOPMENT

Two new publications will assist readers who want to keep in touch with Procurement by the National Aeronautics and Space Administration, and program plans and policies. They are:

*NASA-Industry Program Plans Conference -- The complete transcript of the proceedings (with a few classified deletions) of a briefing session on future plans, programs and policies held in Washington July 28-29, 1960. 123 Pages. 75 Cents. (Order by title from Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

*Selling to NASA -- a new and expanded guide to NASA procurement, including a listing of procurement and small business contacts at NASA's various Research Centers. 23 Pages. Single free copies will soon be available. (Write Office, Procurement and Supply, NASA, Washington 25, D. C.)

Three more briefing sessions on special phases of NASA's programs are now scheduled for this fall. Conference dates and locations are:

Goddard Space Flight Center
August 30, 1960

This Center is responsible for scientific satellites, sounding rockets, manned space flight, and tracking and data systems. The conference will be held in the Departmental Auditorium on Constitution Avenue between 12th and 14th Streets, N. W., Washington, D. C.

(Address inquiries to Industry Conference, Goddard Space Flight Center, Room 103, Bldg. T-28, Naval Receiving Station, Washington, D. C., telephone LUdlow 4-4106.)

George C. Marshall Space Flight Center
September 27-28, 1960

The responsibilities of this Center include development of advanced launch vehicles. Because of the physical limitations of facilities for such a conference, attendance will be held to 300 persons. Those invited will have an opportunity to inspect the Center's test facilities and laboratories. Every effort will be made for fair representation of Industry.

(Address requests for information to Special Events Branch, Public Information Office, George C. Marshall Space Flight Center, Huntsville, Ala., telephone JEfferson 6-4411, extensions 37357, 32353.)

Jet Propulsion Laboratory
October 26, 1960

Lunar, planetary, and interplanetary programs and operation of the deep space tracking net are carried out at the Jet Propulsion Laboratory of the California Institute of Technology. The conference will be at the Huntington-Sheraton Hotel in Pasadena, Calif.

(Address inquiries to Industry Conference, Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena 3, Calif., telephone SYlvan 0-6811.)

* NEW ARMY RESEARCH ORGANIZATION

"GIMRADA" is the newest alphabetical delicacy served up by the Pentagon.

The letters symbolize the Geodesy, Intelligence and Mapping Research and Intelligence Agency which will be established at Ft. Belvoir, Va. under Col. Leonard L. Haseman.

The new agency will assume all functions of research and development formerly handled by the Army Map Service and the Engineer Research and Development Laboratories' Topographic Department. This will include the letting of contracts "for such necessary services as may be furnished by outside agencies."

"Long range missiles or even artifical satellites may serve as vehicles to help in collecting needed data," Col. Haseman stated. "On the other hand, if they are successful, their great speed and range may produce such tremendous quantities of raw data that present conventional techniques may break down."

"Therefore, GIMRADA must also develop equipment to accelerate the processing of mapping, geodetic and intelligence data..."

* RESEARCH AND DEVELOPMENT SOURCES SOUGHT

U. S. Army Transportation Research Command, Ft. Eustis, Va. is seeking organizations with research and development capabilities in the following fields:

✓ Improved Helicopter Sling Load Capability

✓ Studies of Mechanisms of Radiation Changes in Biological and Chemical Systems

✓ Ground Effect Machines -- particularly in the area of stability and control, supplemental aerodynamic lift, recirculation, structure and transportability and material handling devices

(Request for information on capabilities issued by Research Contracting Officer, U. S. Army Transportation Command, Ft. Eustis, Va. Direct phone inquiries to Mrs. Betty Graves, Ft. Eustis, Telephone: TRinity 7-1311, Ext. 21909)

* RADIOLOGICAL INSTRUMENTS

A special working group of the National Academy of Sciences has agreed that there is "no need for an instrument that only provides a radiation alarm" in considering fallout warning devices for general use. The committee declared that such instruments should be designed to provide quantitative information, such as roentgens per hour for rate meters.

The working group concluded that the most difficult problem to be faced is that of insuring effective use of such an instrument. This means the proper interpretation of readings, the application of information on the effects of various dose levels, and the translation of information into effective protective action.

The National Bureau of Standards has conducted tests on a widely publicized combination radio and radiation alarm system which employs cadmium sulfide crystals. According to their report, over 900 such crystals were purchased by the organization preparing such devices, but only 21 were found suitable.

I N V E N T I O N S W A N T E D

The Armed Services and various civilian agencies of the U. S. Government look to private industry, research organizations and the individual inventor for assistance in solving these problems.

Subscribers interested in these requirements may write Service Department, Washington SCIENCE TRENDS, 1120 National Press Bldg., Washington 4, D. C. You will be furnished with the Official Requirement Number and Title, and with information on how and where to submit proposals.

( ) GAS GENERATOR -- This gas generator must be small and light-weight. It would be used for energizing boundary layer control systems in aircraft -- and would preferably use the aircraft regular fuel.

( ) SYNTHETIC FIBER -- This fiber must have the ability to withstand atmospheric reentry temperatures of 1800° F while retaining a strength to weight ratio equal to or better than nylon at room temperature. It is to be used as part of a recovery system or deceleration device.

( ) INFRARED TRANSMITTING MATERIALS -- The following requirements must be met: (1) 75% transmission from 0.8 to 8 micron wavelength in 1 cm thickness. (2) Melting or softening point above 500° C. (3) Capable of standing thermal shock of 100° C per second. (4) Be resistant to abrasion under flight conditions and to atmospheric moisture where stored.

( ) THERMIONIC ENERGY CONVERTER -- The Government is looking for a new means of space charge compensation in a thermionic diode used in a thermal-to-electrical energy conversion system. Present methods are said to involve close spacing between emitter and collector, or introduction of a plasma in the form of ionized cesium vapor. It is felt that a new technique is required to fully utilize the potential efficiency of this device.

( ) MILLIMETER WAVE GENERATORS -- This is a requirement for compact, efficient generators and amplifiers at 10 watts and above. It is believed that high-power devices would permit the exploration of frequency ranges and their applications which are presently unavailable.

( ) MISSILE HEIGHT SENSOR -- This device should not weigh more than 10 pounds. It should permit an incoming missile to accurately sense its height above a target at altitudes up to 5,000 feet -- with standard deviations not exceeding 10 percent of the measured height. In addition the device must be new and unique -- based upon phenomena other than electromagnetic radiation, pressure, inertial principles, time from launch or other standard techniques for altitude sensing.

( ) RECORDING CAMERA -- The need exists for a camera which will use 35 mm film and will record oscilloscope presentations eliminating shutter motion and fly-back time. It must be capable of photographically recording 100 percent of the oscilloscope presentation, at variable speeds up to 100 frames per second.

( ) METEOROLOGICAL PREDICTION -- A method is required using simple calculation or formula to predict atmospheric characteristics at various altitudes over a point up to a thousand miles away, with high accuracies.

P U B L I C A T I O N C H E C K L I S T

( ) OCEAN SCIENCES AND NATIONAL SECURITY, an outstanding survey-report prepared by the Library of Congress covering new perspectives and potential research programs in such fields as defense, mineral deposits, energy, meteorology, transportation and other topics. 180 Pages. Single Copies Free. (Write Committee on Science and Astronautics, U. S. House of Representatives, Washington 25, D. C. for House Report No. 2078)

( ) MILITARY SUPPLY MANAGEMENT, a critical survey of military practices in various areas of supply management including electronics, communications, surplus disposal, data processing and related areas. 40 Pages. Single Copies Free. (Write Committee on Government Operations, U. S. House of Representatives, Washington 25, D. C. for House Report No. 2042)

( ) QUARTZ CONSTANTS, a monograph on a "unique" method of determining the six elastic, two dielectric, and two piezoelectric constants of quartz. 22 Pages. 15 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for NBS Monograph No. 9)

( ) TEMPERATURE-INDUCED STRESSES, offers a means of quickly determining stresses in a slab, in a cylinder or in a sphere subjected to either of two modes of heating. 27 Pages. 25 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. C 13.44:2)

( ) INSTRUMENTATION IN AUSTRIA, a report for exporters providing data on scientific, laboratory and industrial process instruments in Austria. 12 Pages. 10 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. No. C 41.92:Au 7)

( ) AEC PROCUREMENT, one new and one revised chapter of the official AEC Manual on Procurement and Contracts. Chapter 9118 covering costs principles is available at $1.05. Chapter 9111, covering standard contract language reflecting cost-reimbursement principles is available at $1.30. (Write Office of Contract Policy, Atomic Energy Commission, Washington 25, D. C.)

( ) TITANIUM ALLOYS, a study of 16 titanium alloys containing 4 to 16 percent vanadium and up to 4 percent cobalt. 13 Pages. Single Copies Free. (Write Publications-Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigation No. 5591)

( ) CALCULATING OIL RECOVERY, a fast and accurate technique for calculating oil recovery by expansion of dissolved gas. Said to eliminate time-consuming calculations by petroleum engineers. 18 Pages. Single Copies Free. (Write Publications Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigation No. 5580)

( ) FAST BREEDER REACTORS, a report which briefly reviews the need for fast breeder reactors, describes capital costs, and discusses a number of other facts. 12 Pages. 50 Cents. (Write OTS, U. S. Department of Commerce, Washington 25, D. C. for Pub. TID 8523)